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ABSTRACT

The existing body of learning style (LS) research was reviewed from the standpoint of its applicability to adult populations. It was discovered that most existing LS research has been conducted on populations of school- and college-age students in classroom settings and does not consider self-directed, informal, or incidental learning. The following problems/issues relevant to the transferability of existing LS research to adult populations were identified: (1) developing unity and coherence in a consistent definition and body of theory about LS; (2) transferring research findings to adults from existing studies centering on school students; (3) accepting the premise of stability in LS posited by existing theory in light of evidence to the contrary; (4) assigning LS "types" as a commonly accepted albeit simplistic and reductionist use of LS theory; and (5) applying research to instructional practice in a sensible way. The following issues were identified as requiring further research: those dimensions of LS that are most important when considering adult learners; effects of demographic variables on LS; LS stability; ways of applying information about LS in instruction and accommodating individual LS; relationships between environment and LS; and ways of empowering learners through knowledge of their own styles. (Contains 40 references.) (MN)

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Learning Styles in Adult Education:
Issues for Research and Practice

by

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September, 1994

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Learning Styles in Adult Education:

Issues for Research and Practice

Abstract

This paper presents a call for research in the area of adult learning styles. An outline of existing learning styles research is presented and critiqued, focusing on models and inventories for assessing learning styles constructed by Dunn, Dunn, and Price (1982), Gregorc (1982), Hill (1982), Keefe (1987), Kolb (1984), Lawrence (1982), Letteri (1982), McCarthy (1987), and Schmeck (1982). Problems with existing research are raised in the following areas: (1) developing unity and coherence in a consistent definition and body of theory about learning styles; (2) transferring research findings to adults from existing studies centering on school students; (3) accepting the premise of stability in learning style posited by existing theory in light of evidence to the contrary; (4) assigning learning style "types" as a commonly accepted although simplistic and reductionist use of learning style theory; and (5) applying research to instructional practice in a sensible way.

Learning Styles in Adult Education:

Issues for Research and Practice

Introduction

Learning styles research holds a powerful potential for the field of adult education. Many areas of learner-centered education are currently receiving a great deal of attention, including self-directed learning, distance education, informal and incidental learning, critical reflection, and transformative learning in the context of emancipatory education. A substantial and coherent body of research-supported theory about the variables influencing the unique ways that individual adults learn, and how these ways of adult learning can be effectively used to plan and organize learning endeavors, is absolutely essential.

The existing body of learning styles research has identified a number of multi-dimensional variables that influence the different ways that different individuals perceive and then process new information. These variables embrace a myriad of cognitive, affective, and physiological dimensions of human functioning and preference. Much of this research, conducted with populations of school-age children or college students, has produced instruments that can be used to determine people's idiosyncratic "learning style." These instruments have been appropriated for classroom use by educators who, responding to the pressure to adapt instructional methods based on knowledge about differentiated learning styles, have struggled to make practical sense of what seems to be a highly impractical notion that instructional methodology should accommodate a wide variety of student learning styles at once.

In the field of adult education, much learning is self-directed, informal, or incidental. As a result, the accumulating knowledge that people enter the learning journey in qualitatively different ways

seems simply to confirm the need to encourage more independent learning. However, an abundance of whole-group instruction or single-system materials that are intended to target large populations still exists in higher education institutions and private or public sector training and development programs. These settings, although they are very different from public school classrooms, are being influenced by learning styles research in much the same way that public school classrooms are themselves being influenced.

Although it is clear that people learn in different ways, the popular speculation that instruction necessarily should be adapted to these different ways needs to be re-examined. This paper will argue that while learning style models are potentially powerful tools, adult educators should not thoughtlessly move them into the instructional arena of adult education without first addressing some serious concerns.

The first concern that must be addressed is that insufficient evidence exists for adult populations showing clear links between instruction based on knowledge about learning styles and improved learning. For practitioners, the paucity of research indicating clear, "do-able" methods for implementing learning styles research has left a serious gap between theory and practice. All too often the assumption seems to be that not only will this gap be resolved at the classroom level, but that practitioners will somehow be able to synthesize the different emphases, variables, and models presented to them by different researchers.

The second concern is that there are inherent dangers in helping adults find their "type" of learning style, especially using inventories that often were developed for school students. The third concerns stems from a facilitator's or course developer's perspective. Th concern centers on the overwhelming amount of sometimes conflicting information that is coupled with the frustrations of attempting to mediate a wide assortment of learner preferences and needs. As a result, trying to force learning styles is likely to result in either over-generalization of learning styles principles

(deciding to simply offer a wide variety of activities and hope to satisfy everyone at least some of the time), vulnerability to quick-fix learning style packages and programs which are offered in abundance by publishers and short workshops, and surrender or outright rejection of the possibilities of implementing learning style models as being anything but a futile and impossible way to deliver instruction coherently.

Defining "Learning Style"

What is a learning style? How is it different from or related to cognitive style? What human processes are significant in the way we search for and construct meaning? Existing definitions reflect wide differences in the way researchers conceptualize the relationships between learning and cognitive style, personality factors that influence the learning process, environmental and activity preferences, responses, and abilities.

As a starting point, Smith's (1982) definition of learning style is much-quoted: "the individual's characteristic way of processing information, feelings, and behaving in learning situations" (p. 24). In contrast, cognitive style is defined by Merriam and Cafferella (1991) as "consistencies in information processing that develop in concert with underlying personality trends" which "encompass the ways people see and make sense of their world and attend to different parts of their environment." (p. 175).

Some theorists equate learning style with cognitive style. Schmeck (1982), for example, views learning style as a "cross-situational consistency in the use of a particular learning strategy" (p. 78). Other researchers such as Dunn and Dunn (1978) emphasize the individual's affective responses to learning and physiological preferences in learning environment when identifying learning style. They pay little attention to idiosyncratic cognitive processes.

Keefe (1987) provides a chart (see Figure 1) that helps summarize the main cognitive, affective, and physiological elements of learning style. These aspects of learning style have provided the focus for various research studies, where "cognitive styles are information-processing habits; affective styles, motivationally-based processes; physiological styles, biologically-based responses." (p. 14). Many of these elements have been studied as single dimensions. For example, field independence vs. field dependence has received much attention since the work of Witkin et. al. (1954). The diversity of elements listed here and their complex nature suggests that learning style is not a static, quantifiable substance, nor should it ever be construed as a tidy set of labels that can diagnose and prescribe.

STUDENT LEARNING STYLE

Cognitive Styles

Reception Styles
Perceptual modality preferences
Field independence vs. dependence
Scanning
Constricted vs. flexible control
Tolerance for incongruous or unrealistic experiences
Strong vs. weak automatization
Conceptual vs. perceptual-motor dominance

Concept Formation and Retention Styles
Conceptual tempo
Conceptualizing styles
Breadth of categorizing
Cognitive complexity vs. simplicity
Leveling vs. sharpening

Affective Styles

Attention Styles
Conceptual level
Curiosity
Persistence or perseverance
Level of anxiety
Frustration tolerance

Expectancy and Incentive Styles
Locus of control
Achievement motivation
Self-actualization
Imitation
Risk-taking vs. cautiousness
Competition vs. cooperation
Level of aspiration
Reaction to reinforcement
Social motivation
Personal interests

Physiological Styles

Sex-related behavior
Health-related behavior
Time-of-day rhythms
Need for mobility
Environmental elements

Figure 1. A Summary of Influences on Student Learning Style (Keefe, 1987, p. 14).

Learning style is complex and multi-dimensional, embracing not only cognitive processes and strategies but also emotions, learning activity preferences, environmental comforts, internal rhythms, and psychological needs. Definitions of learning style, as used in the research literature, also tend to reflect a certain set of underlying assumptions which should be made explicit before going further.

First, most concepts of learning style presented in these definitions do not refer to developmental changes, which assumes that learning style is stable; the definitions and models usually do not specify a target group under discussion, which assumes that the same variables affect learning equally in children and adults; these definitions do not refer to context, which assumes that individuals' ethnicity and socio-economic background, as well as their political and socio-cultural learning milieu, are not significant factors affecting learning style; and finally these definitions do not appear to have unity and coherence. All of these omissions and assumptions are problematic.

Developing Unity and Coherence

The first problem evident in these different ways of defining learning style is the lack of a comprehensive, coherent conceptualization or model. Merriam and Caffarella (1982) point out that not only is there no unifying theory underpinning learning styles research but also that much inquiry has focused only on one dimension of the many possible factors summarized in Keefe's (1987) chart.

Kolb (1984) has constructed a model which attempts to unify these factors and which, incidentally, is widely used in the field of adult education, particularly in instructional practice. His fundamental theory is that learners perceive information along a continuum bounded by the dimensions of concrete experience and abstract generalization. Learners then process that information on a continuum ranging from active experimentation to reflective observation. He posits a learning

cycle, moving through all four of these dimensions, which governs a sort of universal learning process. Then Kolb (1984) intersects these two continuums to create four quadrants, each describing a preferred orientation to learning. He uses a Learning Style Inventory (LSI) to show learners which orientation they are most predisposed towards: Diverger, Assimilator, Converger, or Accommodator.

Others have criticized this model for its assumption that all types of learning are processed at some point through concrete experience or active experimentation (Cunningham, 1987, p. 44) , and for its somewhat limited treatment of the role and process of reflection in the learning process (Mezirow, 1991). Meanwhile Kolb's model does not rest easily alongside other attempts at creating bi-dimensional models of cognitive style. The earlier Style Delineator Model developed by Gregorc (1979) and popularized through use with both school-age and adult learning groups, for example, identifies Random vs. Sequential and Concrete vs. Abstract styles of information processing. Certainly the theme of learning through active involvement juxtaposed with reflection is echoed in Kolb's constructs, but Gregorc's emphasis on organizational patterns of thinking is unique and does not distinguish between perceiving and processing information.

Another claim to answering the need for a comprehensive model has been made by Lawrence (1982). Lawrence argues that the type theory based on the Myers-Briggs Type Indicator (MBTI) serves to unify the many diverse threads of learning styles research (p. 104). This model goes beyond information processing with its four bi-polar dimensions embracing personality constructs: the two mental processes differentiating learning styles are the Intuitive (N) vs. Sensate (S) ways of perceiving meaning, and the Feeling (F) vs. Thinking (T) ways to express values and commitment.

A third dimension types individuals' basic way of relating to the world as either Extrovert (E) or Introvert (I). All three modalities are apparently governed by the learner's dominant approach to

decision-making -- Judging (J) or Perceiving (P). Some research has attempted to correlate the MBTI with Kolb's LSI, although Kolb (1984) himself warns that a certain socio-cultural bias and methodological difficulty affects reliability of the MBTI (p. 80).

McCarthy (1987) has attempted to show the similarities among all three of these and other models of learning styles by using Kolb's model as a sort of four-quadrant Procrustean bed upon which she forces the various typologies constructed by Jung, Lawrence, Gregorc, Hunt, and other theorists. However, Kolb's dimensions of concrete experience -- abstract conceptualization, and reflective observation -- active experimentation are only distantly reminiscent of Jung's constructs of sensing--intuition and thinking--feeling. As a result, McCarthy's summary of Lawrence's work for the purpose of comparison with Kolb creates four quadrants that Lawrence did not intend and reduces Lawrence's four bi-polar dimensions into simplistic and misleading categories is a travesty.

As well, Hunt's (1982) work on Conceptual Level (reflecting learner's need for high structure or low structure) has an entirely different focus than Kolb's conception of the dialectic between experience and reflection. Here McCarthy does both a disservice by attempting a "match." In fact, McCarthy's attempt to force coherence among these learning style theories serves more to illustrate their disparity rather than their unity.

Many of the elements summarized in Figure 1 that are proven significant influences on learning style are not recognized in either Kolb's work, Gregorc's model, or Lawrence's adaptation of the Myers-Briggs typology. Keefe (1987) claims that this problem is resolved by the comprehensive Learning Style Profile of 23 scales developed in 1986 for the National Association of Secondary School Principals (NASSP) representing the four higher-order factors of cognitive styles, perceptual responses, affective, and physiological elements. According to Keefe (1987), this

NASSP model is the answer to coherence and synthesis of the myriad elements of learning modes and preferences shown in Figure 1.

But not even the NASSP model, and certainly not Kolb's, Gregorc's, or Lawrence's models of learning style, address fundamental issues related to contextual factors such as cultural influences. Hill's (1971) highly complex model of Cognitive Style Mapping is unique in its inclusion of cultural codes. Hill shows how Symbols and Meaning (linguistic, psychomotor, sensory data, quantitative, and qualitative feelings, values, and self-insights); Modalities of Inference (induction vs. deduction and reasoning processes); and Cultural Determinants (that shape interpretation of meanings assigned to symbols) all influence cognitive style. However, in the interest of unity and coherence, it is unfortunate that Hill does not address environmental or personality factors considered important by Kolb, Lawrence, Dunn and Dunn, and NASSP in their broader conceptualization of learning style.

Collins (1991) argues persuasively that context is perhaps the most crucial consideration in understanding adult learners. He criticizes the prevailing over-emphasis on individual psychology, ignoring the critical socio-cultural, political, and geographic factors affecting learning and shaping learning style. Jarvis (1987) has a similar position, arguing that "learning is not just a psychological process that happens in splendid isolation from the world in which the learner lives, but is intimately related to that world and affected by it" (p. 11). Future efforts to develop unity and coherence in learning style theory must consider the predominant socio-cultural perspective in contemporary adult education literature that promotes the empowerment of independent learners.

Transferring Research Findings to Adults

A second important problem in learning styles research, after the lack of unity and coherence, is the difficulty of applying the variables affecting learning style identified mainly through research in

schools to adult learners. Bonham (1988) sees this problem as a key issue, noting that "much of the research has been done with children and it is unclear how or whether the findings translate to adults" (p. 14). Smolak (1993) cites research by Flavell (1985) to support her contention that adults not only possess greater expertise and experience which affects their performance on measures of cognition and cognitive style, but also that adult cognition is qualitatively different from, and even superior to, the cognitive styles that children employ (p. 92). This argument would question the very attempt to understand how adults think and act through the lens of research undertaken with young people within the school context. If the cognitive styles of adults are different than the cognitive styles of children, one must conceptualize adult learners as distinct and different. The result would be the attempt to identify adult "learning styles" in the way that is presumed different than the learning styles of school students.

Most existing research on adult learners has been conducted in college settings. The most notable is Kolb's (1984) experiential learning model, probably the most widely used in adult education circles along with its spin-off, McCarthy's "4MAT" system. Much of Kolb's work, and his admitted point of reference, is based on college students. Kolb research suggests, for instance, that a particular learning style correlates consistently with the choice of college major. But choice of college major usually reflects the orientation to life, values, and content preferences of a very young adult. This orientation to life however doesn't necessarily remain stable throughout the developmental life-span of adulthood. Besides, to assume that a worker's occupation will depend on the college major that person held in a given year of his or her youth is faulty. Both common sense and observation reveal that occupational choice after college depends on a variety of factors (available employment, opportunity, family demands, health, changing values). Furthermore, occupational choice itself is extremely unstable in today's economy. Most workers face, and must deal with, rapid changes in their career paths throughout adulthood. Therefore, just because learning style shows some affiliation with college major, it cannot be concluded reliably that

learning style is linked to occupation. To a greater degree it is also faulty to assume that college major is a reliable indicator of the learning styles of an adults' career or general development.

Other researchers, such as Hill (1971), have developed learning style theories based on college students. Brookfield (1985) studied field independence -- dependence among college students in relation to developing autonomy in self-directed learning. Schmeck (1982) worked with college students from the premises that an individual manifests a particular learning style when he or she favors a particular learning strategy, (defined as a "pattern of information processing activities that a person engages in when confronted by a learning task" (Schmeck, 1982, p. 73). Schmeck developed his "Inventory of Learning Processes" using four "scales" that assess dimensions of learning behavior: (1) Deep processing, (2) Elaborative processing, (3) Fact retention, and (4) Methodological study. The most successful college students scored significantly higher on the first three scales and slightly lower on the last -- methodological study. Schmeck went on to show how less successful students could, with awareness of their personal learning processes, take steps to increase their achievement.

However much potential such college setting findings suggest, these theories certainly cannot be generalized reliably to other sectors of the highly diverse population of adult learners without further research. College studies are only marginally applicable to the adult population at large for two reasons: (1) despite growing numbers of older adult students in higher education, the majority of students in higher education are young adults who differ, according to developmental stage theorists (Smolak, 1993), in their cognitive styles and active-introspective orientations than older adults and (2) full-time and even part-time learners in higher education institutions will arguably have a different orientation to learning than adults in the workplace or at home who are not engaged in an identifiable learning enterprise, not only by reason of selection (participation studies suggest a distinctive profile of adults who choose college learning experiences) but also because college learners are in a "learning mode" appropriate to formal academic learning which has demands that

are distinct from the learning demands of the workplace or the home. Furthermore, college learners activate their learning strategies and preferences daily and intensively, probably reflecting on, and possibly continuously improving them. They are conscious that they are learning and that they are supposed to be learning. On the other hand, the learning of non-college participant adults is not conscious. Learning is not a primary daily activity, but rather an unconscious and secondary effect of action. Because the orientation to learning differs between these two distinct groups, it is likely that members of these groups will display a different learning orientation.

Outside of formal academic institutions, there is a lack of studies on the learning styles of adult populations. Data obtained from school-age children or even college-age young adults cannot reliably be transferred to adult learners whose learning style is affected by educational experiences and attitudes, developmental life-stage and cognitive development, and an increased repertoire of cognitive strategies and ways to adapt personal learning style to different situations.

This lack of research on adult learning styles is most unfortunate, because the variables identified in existing learning styles research promise rich insight into adult learning. Hunt's (1982) work linking learners' conceptual level to their ability to structure personal, independent learning has implications for both self-directed learning and for informal learning with its emphasis on autonomy and empowerment (Marsick and Watkins, 1990). Letteri's (1980) Cognitive Profiles, which correlate seven dimensions affecting cognitive processing (field independence-dependence, scanning, breadth of category, cognitive complexity-simplicity, reflexivity-impulsivity, leveling-sharpening, and tolerance for incongruence) with three levels of predicted achievement on standardized tests (Level I is lowest, Level III highest), is school-based in construct and application. However, it offers a springboard for possibly identifying adult Cognitive Profiles. Hill's (1971) attempt to incorporate contextual factors through Cognitive Mapping, while developed with college students, holds potential for research on more diverse adult learner populations where cultural determinants and symbols/ meanings are essential influences that shape

beliefs, attitudes, and perceiving processes. The Dunn, Dunn and Price (1978) model, which emphasizes environmental and affective factors, also promises an interesting validation of adult learners' learning styles, in light of the number of participation studies showing that climate and environmental concerns are key "enhancements" (see Merriam and Caffarella, 1991, Chapters 5 and 12, for summaries of participation studies).

As a result, although existing research on learning styles cannot be generalized to adult learners, certainly much of the work theorizing conceptual frameworks which synthesize essential dimensions of cognitive processing, affective responses, environmental preferences, and contextual influences offers a solid starting point for future study.

Accepting the Premise of Stability

A third difficulty in applying learning styles research to adult education is the dilemma of stability. Most current theories support the belief that a person's learning style does not vary with the learning task, the learning environment, or even the individual's life stage of development (Merriam and Caffarella, 1991, p. 175). Keefe (1987) explains that affective, cognitive, and physiological processes "serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 7).

However, as we have seen, this theory is based on groups of young learners who live within public schools or academic institutions. As examples, see Dunn's (1982) synthesis of research shows that learning style remains constant for school-age students regardless of the subject under study. Stability appears even in older populations studying in academic institutions, such as in Pask's (1988) research which even surprised the researchers when it found constancy in choice of learning strategy for various learning tasks among polytechnic students (p. 90). However, Pask chooses not to acknowledge the contextual consistency imposed by the fact that his research was

constructing and tracking the learning process or that the learning tasks he studied all occurred at a particular point in time and, therefore, at a particular period in the learners' lives and learning careers.

Meanwhile, Lawrence (1982) has noted that some ongoing maturation studies suggest that learning styles may shift because of development, and that such a shift may be attributable to changes within the individual, to adaptation to different types of instruction, or to interaction between the two. The context of these findings is school children, and the critical reader of Lawrence's work can speculate even more dramatic shifts in the adult's life world where interaction with a family, the workplace, and other contextual variables may impact changes in learning style.

In addition, adults have accumulated learning experience and a greater learning strategy repertoire. These influences are bound to effect changes in learning styles. As well, non-learning influences that have been shown important in the adult learner's process, such as life-crisis events and changes in development of discipline, maturity, values and attitudes, can reasonably be expected to affect stability of learning style.

Smolak (1993), summarizes a variety of theories which describe adult development as a series of life-span stages. These theories show that theorists continue to argue that significant shifts in certain dimensions of personality occur which seem to directly affect emotional responses, cognitive orientation, and social behaviors. These shifts, in turn, suggest changes to preferential modes of learning. For example, Smolak cites suggestions from adult stage-development theories of Jung, Erikson, and Levinson which show that greater introspection or the tendency to reflect in middle-age stages. Newman (1982) also suggests that metacognitive processes become more dominant in middle age. By contrast, learning style theorists who centralize the predilection to process information through "reflection" or intuitive or introspective processes (as opposed to "active experimentation" or concrete engagement) as being a key determinant of an individual's

particular style of learning, do not show this predilection as a growth characteristic related to maturity or life stage. Rather, they suggest that this predilection is a stable characteristic intrinsic to particular individuals.

Schaie's (1977/78) theory argues that, while the structure of adult thought does not change through various stages of development, the functional use of thought does change. Using his terminology for these changes, we can reasonably speculate that an adult functioning in the "responsible" or "reintegrative" stages of cognitive use, which embrace different problems and contextual consideration affecting the problem-solving process, will approach learning in different ways than the adult in the youthful "achieving" stage.

Kirby (1988) posits a gradual change of learning style over life span development, from global forms of information processing to analytic forms of processing. The highest level of development is what Kirby calls "integration" of skills in a sophisticated flexible, adaptable style which cannot be typed as any particular learning style. This developmental perspective of learning style challenges the prevailing notion of stability and suggests a re-thinking of the common conception of learning styles as distinct and separate, whether through bi-polarity or positioning on a quadrant. This developmental perspective instead focuses on the individual's process of continuous, organic development in approaches, preferences, and strategies of learning.

Insufficient evidence exists to prove or disprove the notion that learning style is stable for adults. However, from what we do know about adult learning, as represented in this summary of research findings, questions should certainly be raised about the assumption that learning style does not change among adult groups.

Assigning Learning Style 'Types'

A fourth set of concerns in learning styles research relates to the "typing" of learners, particularly in light of the serious doubts raised about the common assumption that learning style is stable. Many learning style models are based on bi-polar dimensions which typically intersect with one another to produce a typology, often consisting of four quadrants. Learners are placed into one of the quadrants or types. The learning styles inventories offered by Letteri, Kolb, McCarthy, Lawrence, Schmeck, Gregorc, Torrance, and others purport to profile learning types in this manner. As well, both Kolb's and Lawrence's work links learning modes to deeper personality characteristics, values, world views, and social orientations -- areas where 'typing' of individuals is potentially subject to misleading uses.

The premises of these learning styles inventories must be critically questioned. Bonham (1988), for example, argues that labeling people at either end of a dimension cannot capture the complexity of individual differences among human beings (p. 15). Even when theorists caution that these dimensions are in fact continuums, the very existence of quadrants into which learners are placed or "profiled" effectively freezes the notion of dynamic continuum into stereotypes of learning style. A good example of the contradiction created is found in McCarthy's (1987) work. She notes, without raising the obvious critical questions, that "We hover near different places on a continuum.... and the place where we hover is our most comfortable place" (p. 5). She then proceeds to firmly stamp learners as Dynamics, Innovators, Analytics, or Common Sensors, a category system based on Kolb's system that types learners as Assimilators, Accommodators, Divergers, and Convergers. Jarvis (1987) has criticized Kolb's work as being too simplistic -- a criticism that can also be made about McCarthy's work.

Given the magnitude and differences in type of the various dimensions (cognitive, affective, and physiological) represented in learning styles, is it reasonable to expect that a reliable aggregate of these dimensions can be formed and assigned *en masse* to a particular learner who exhibits certain

characteristics resonating with some features of that category? And, can the existing instruments reliably assess this aggregate of characteristics?

Dunn (1982) has shown that Learning Style Inventories vary in quality, some actually not valid or reliable but easily available and marketed heavily by publishers and consultants. Kolb (1984) notes that the self-analysis and report method adopted by most learning styles inventories is problematic because it measures learners' perceptions rather than their actual behavior. Certainly the predominant procedure of identifying learning style, where respondents choose a word from a group that they feel most closely describes them, is subject to problems stemming from miscomprehension, misinterpretation, or over-rapid selection of words; the influence of context; and the distortion by a learner's own perception of self and the concept of learning style. Keefe (1987) points out that each inventory conceptualizes learning style in a very particular way and indicates that there may even be socio-cultural bias embedded in certain inventories that is not readily apparent. In light of these concerns, misreading and misinterpretation of learning style data certainly seems possible.

Even if learners can be reliably "typed," is this process liberating or limiting? That is, do learners armed with the knowledge of their personal learning type, whether it be Gregorc's "Concrete-Sequential," or Kolb's "Converger," or Myers-Briggs' "ISTJ," or Letteri's "Level 2," alter and possibly limit their learning choices, activities, and responses to fit this perspective? Do learners use the information to diagnose deficiencies in themselves which they seek to remedy through 'training' in learning strategies or exposure to modes of discomfort? Or, do learners justify their own inflexibility under the umbrella of their 'type?' Smith (1982) actually recommends that adults use their own knowledge of their learning styles to select or reject learning experiences, a notion that hopefully is disregarded by students and educators promoting a lifelong, flexible orientation to learning.

Caution is required in choosing and applying learning style inventories to help learners find their "type." Inventories must be selected with care to avoid poorly constructed or invalid measures of learning style. Objectives of using such inventories must be clear to both learners and the sponsoring institution. The limitations, underlying assumptions, and potential misuses of learning style typologies must be made explicit. Adults are notorious labelers and, in these times when everything from leadership style to typologies of "difficult people" are thrown into the pop psychology fringe of adult education, the practice of 'typing' learning style must be handled judiciously. If it is not, the whole concept of idiosyncratic approaches to learning will be soon disregarded as a passing fad.

Applying Research to Practice

Learning styles research has been widely recommended for transfer to teaching practice by enthusiasts who preach individualized or "personalized" (Keefe, 1987) education. However, such recommendations are not supported with sufficient research on how adults learn. In particular, questions are posed in this section about the assumptions that (1) learning improves when instruction is based on knowledge about learning style; (2) individual learners will improve achievement through awareness of their own learning style; and (3) teachers can and should accommodate multiple learning styles in a learning situation. In addition, concerns about classroom application will be raised regarding the use of readily available learning style inventories; the pervasive popularity in adult education of the "4MAT" system of defining and accommodating learning styles; the untested application of certain split-brain research; and the reason for caution in translating learning style findings into practice.

The assumption that learning improves when instruction is based on knowledge about learning style has been applied in varying ways. This assumption has only met with some disagreement. Some theorists who advocate understanding learning styles and allowing this knowledge to

"direct" classroom teaching promote changing the learning environment to "match" students' learning styles (Dunn, R., 1982; Butler, 1982; Lawrence, 1982; Entwhistle, 1988; Marton, 1988; Ramsden, 1988). Others argue for changing the students' learning style by "training" them in their areas of weakness (Letteri, 1982; Schmeck, 1982; Das, 1988; Kirby, 1988; Weinstein, 1988).

The National Association of Secondary School Principals states that schools ought to change the learning environment to create an appropriate match with individual students' learning styles for the affective and physiological dimensions and provide remediation for students to improve their cognitive style of functioning (Keefe, 1987, p. 36). McCarthy (1987), however, argues that if students are taught only through instructional approaches tailored to meet the needs of their own particular learning style, they will not develop other necessary learning skills (p. 53). Hunt (1982) accommodates both points of view, explaining that it is important to consider the assumptions underlying the theory of matching teaching to learning styles. He identifies two main orientations evident in practice: (1) the "contemporaneous" orientation accommodates the learner's needs as much as possible at a given time, while the "developmental" approach stresses the need to help learners grow by exposing them to alternative ways of learning and (2) teaching them strategies to access these. None of these theorists addresses adult learning contexts.

Dunn (1982) cites a number of independent studies through the late 1970's and early 1980's (and literature reviews of many more studies) conducted at all school levels. All these studies are shown to corroborate the assumption that students learn more, learn more easily, and remember better when taught through their own preferred learning style. Some focused on the situation, by altering environmental conditions to provide a "match" with students' preferred learning modes in various dimensions. Others focused on the student by developing cognitive strategies to improve learning.

However, these results must be viewed with caution, especially in light of Carbo's (1980) review of the 1970's literature uncovering problematic designs and interpretations. Dunn (1982) herself

raises a concern about the number of unreliable learning style inventories being used in research up to that time. Researchers besides Dunn, such as Price (1982) and Schmeck (1982), called for further research and analysis of how instruction relates to learning style. Although eleven years have passed since their concerns were published, little additional research has addressed this issue. (Contemporary research in learning styles appears to have shifted to hemisphericity and its relation to instructional practice.) None has used populations of adult learners.

It would seem that, although there is some evidence to support a link between children's learning style and school instruction based on knowledge of this style (whether focused on altering the person or the situation), this link needs clarification. Critical readers of learning styles research are left with a critical question: to what extent do instructional programs based on learning styles research actually produce a significant improvement for adult learners? Common sense may dictate that adults will learn better when taught through their preferred learning style, but reliable research is required before practice should be based on such an assumption.

Another question arises from learning styles research concerns the assumption that learners will somehow benefit through awareness of their learning style. The reasoning seems to be that such knowledge helps learners themselves recognize either a "mismatch" between their style and a particular learning environment or a "deficiency" in their own cognitive strategy, both of which can be deliberately solved. This sort of application is attractive for the field of adult education, retaining the learner-centered control over application of learning style knowledge. And, in fact, many facilitators of adult education classes introduce students to Kolb's (1984) model of learning styles as a way of helping them begin to think about how this style affects their academic success, learning choices, potential barriers to learning, interactions with other learners, and personal teaching styles.

But, again, there is little else in the way of reliable data gathered from adult populations corroborating the pleasing assumption that knowledge about their learning style can be instrumentalized by individual learners to enhance their learning. This concern is not just a cranky attempt to restrain practical use of potentially powerful information. Until solid evidence is developed to support adult learning styles and their application to instructional practice, such inventories risk comparison to a wide range of other self-administered psychological, para-psychological, and astrological instruments all purporting to increase self-awareness and enhance self-development. Furthermore, encouraging individuals to "type" themselves into a specific learning style category using some of the available inventories is potentially limiting, misleading, and open to misinterpretation and misuse. Adults who believe they fit a certain learning style may assume complacency about developing flexibility or alternative cognitive strategies ('I'm not learning because the mode doesn't suit my style'). They may select or reject learning experiences based on knowledge about their preferred style. In any case, adult learners must be appropriately informed about the potential inaccuracies, limitations of use, and lack of proven links between the results of learning style inventories and improved learning.

A third question arising from learning styles research emerges from the assumption that seems to underpin much of the teaching practice based on learning styles: teachers CAN and SHOULD accommodate a variety of learning styles through instructional methodology. This assumption is based on the principle of "matching" learning environment to individual learning style, but it goes further to imply that a single teacher facing a group of at least thirty learners in a contiguous learning environment is physically and psychologically capable of accommodating the various learning styles represented by the students in his or her classroom. Teacher overload or superficial implementation are more likely outcomes of such a belief. And, most teachers probably will conclude that as long as they use a variety of instructional strategies they will more or less accommodate everybody. Administrators, consultants, and researchers who recommend, like Keefe (1987), that instruction should be "personalized" for each student do not seem to

acknowledge the impossible logistics of such a demand in the formal classroom settings of learning still evident in much corporate training and development as well as adult education in higher education institutions -- especially in the current educational climate that almost always "pushes" more and more students into a single classroom. And, with the preponderance of mainstreaming in today's classroom, the needs of the students within one class promise to be widely different.

As well, students' learning styles will have been determined in most cases by a single instrument which may or may not reliably describe the complex interweaving of each student's cognitive style and affective or physiological learning preferences. Few teachers have the time to investigate the field of learning styles in sufficient comparative detail to make informed choices about learning style inventories -- which to choose, how to use the data, or how to balance the results with other information.

Gregorc (1982) warned twelve years ago that instructional use of learning styles research could become a "fad" with negative effects "arising from misuse, abuse, and diminution of information and research data" (p. 8). Of the five negative forces summarized by Gregorc (1982), three will be recognizable by adult educators as pervasive in the field today: (1) both "superficial and complex presentations" of information on learning styles to practitioners (with equally useless outcomes); (2) "the emergence of snake-oil peddlers" offering simplified applications of learning style products; and (3) "the illusion of a panacea" created by the assumption that applying match-mismatch principles will solve the problems of adult participation and success in learning documented so thoroughly in research on barriers and enhancements to adult education.

As one example, McCarthy's (1987) "4MAT" program of instruction (based on Kolb's model of learning styles) has been appropriated widely for use in adult education settings such as college institutions in training programs for new instructors. Although much has been written to support the 4MAT model or to suggest practical strategies for implementing it in schools, research studies

validating 4MAT are few and relatively unhelpful in disclosing the benefits of its systematic implementation. Only two studies emerged in a recent ERIC search: Bowers (1987) found significant differences favoring Grade 6 students exposed to 4MAT instruction when compared to a control group of similar abilities and Sangster and Shulman (1988) found positive teacher and student attitudes towards implementation and success of the 4MAT instructional cycle in Ontario high schools.

Such findings may indicate some favorable possibilities for implementation of 4MAT in the school system, but these findings carry little import for facilitators of adult education. First, a key fault with the model is its premise that a learner typed in one of the four learning-style quadrants identified by McCarthy (innovative, analytic, common sense, and dynamic) will have opportunity to receive instruction in the preferred mode 25% of the time when the teacher implements the learning cycle. But this means that 75% of the time that learner's needs are not "matched" with instructional style, which raises all kinds of questions about learner responses and the type of learning (or avoidance) that will result. Second, the 4MAT model does not translate well to an adult education context. The assumption of the 4MAT model is that learning is largely teacher-controlled, where instructional objectives, learning activities, and evaluation methods are designed and implemented by a facilitator external to the student. Knowles (1978) and others subscribing to his theory of andragogy would argue that such an instructional stance is not appropriate for many adults, much of whose most important learning is informal and incidental (Marsick, 1991) and self-directed, as evidenced in research by Tough (1979) and Spear (1988). Finally, basic concerns raised about the Kolb (1984) model of experiential learning, upon which McCarthy's 4MAT approach is based, deserve response before implementation should be considered.

The 4MAT system of defining learning styles and prescribing instruction is predicated upon another body of controversial brain research which is figuring alarmingly in recommendations for instructional practice. This research is centered on hemisphericity. The common line of argument in

hemisphericity research is that instructional strategies addressing the left or the right brain can "enhance" discrete functions ascribed to each hemisphere, thus improving learning, unleashing creativity, and fostering holistic personal development.

The assumption gleaned from split-brain research is that the right half of our brains processes information in non-verbal, spatial-visual, intuitive, holistic ways; whereas, the left half functions in logical, analytic, sequential ways, processing verbal and digital information. Further speculation is that many students "favor" the right brain which, in "traditional" school methodology, is not accommodated in instructional approaches as frequently as the left brain. Certain theorists advocate that instructional methods aimed at the right brain will not only accommodate the learning needs of these right-brainers more effectively but will also unleash the creative powers of left-brained individuals. As a result of their beliefs, they design and promote materials for direct classroom application which engage "the whole brain." The rhetoric of such writers is highly appealing, couched in terms which imply neglect by adult education facilitators of vital aspects of their students' personal growth. For example. McCarthy notes that "it is time to teach to the whole brain, intellectual and intuitive, mind and heart, content centered and student centered." (McCarthy, 1987 , p. 75)

The danger of leaping so quickly to practical application from the, as yet, problematic and early research on hemisphericity, or indeed from any of the unclear conclusions about adult learning styles and their link to learning shown earlier in this paper, is akin to publishing a cookbook with untested recipes: many frustrated cooks will have difficulty being persuaded to buy future editions when they suffer culinary failures. Practitioners who "buy into" ready-made techniques for "whole brain" teaching or matching instruction to learning styles and find either no effect or negative effect in their learners may be unwilling to give further credence to the whole area of future brain research and learning styles inquiry, which may yet yield more relevant results for practitioners. Regardless, practitioners should not be forced unwittingly to use their own instructional settings as

laboratories. Superficial exposure to a variety of models of learning styles is more likely to leave practitioners confused than informed. Furthermore, the implications that complex adaptation of instruction is required to mediate the pressing and highly individuated needs of their learners is more likely to produce feelings of frustration than inspiration.

Conclusion

Adults differ widely in their ways of perceiving and processing information. Their unique ways of learning are influenced by idiosyncratic affective and physiological elements, important developmental processes, and broader contextual variables such as socio-cultural background and geographic-political milieu. While much existing learning styles research offers valuable insight into intrapersonal dimensions inherent in some of these broad influences, the body of knowledge developed thus far is fragmentary, sometimes problematic in research design and application, and limited in use for adult educators because it has been derived largely from institutional academic settings using populations of school children. Even the research on the learning styles of college-age students, although they are older, has more in common with youth learners than with the broader population of adult learners functioning in the world.

Many practitioners have used this research on young students to make highly inferential and premature leaps into adult classroom. The resulting applications of learning style inventories and modification of instructional strategies to "match" learning styles with adults may be well-intentioned, but it rarely provides fully informed improvements in the learning of individual adult students. As demonstrated earlier in this paper, the application of research findings from one context that do not match another context holds detrimental possibilities for both teacher and student.

Whatever the drawbacks, successful efforts to identify learning styles in schools and to somehow use what is learned to accommodate the individual learning styles of adults does indicate some

promising directions for adult education. However, there is great need for coordinated research efforts specifically targeting adult learners. This paper has discussed a number of concerns. These concerns give rise to specific questions that should be addressed in future research on adult learning styles:

1. (a) Which dimensions of learning style identified so far in research are most important in considering adult learners?
(b) What further dimensions need to be investigated?
(c) How do these dimensions inter-relate in various learning situations?

2. What are the significant effects of ethnicity, socio-cultural background, political milieu and geographic location on learning style?

3. (a) How stable is learning style?
(b) To what extent is learning style constant for different learning tasks, environments, learning peer group, and stages of development?

4. (a) How should knowledge of learning styles be applied in instruction?
(b) What implications have learning style for planning and organizing educational enterprises?

5. (a) To what extent is it possible to accommodate learning style of an individual?
(b) To what extent can learning styles of several individuals be effectively accommodated in a contiguous group?
(c) How can these be accommodated?

6. What changes in learning result when the environment is changed to accommodate learning style?

7. What changes result when learners are made aware of their own learning style, or taught specific strategies to address these?

8. How can learners be empowered through knowledge of their own learning styles?

Research which provides answers to these questions holds a powerful potential in adult education. It will provide the necessary coherent and unified theoretical foundation for understanding individual adult learning styles that is currently lacking. It can indicate differentiated intrapersonal elements which must be considered in the continuing inquiry on self-directed learning, in the body of theory developing rapidly about transformative learning (Mezirow, 1991), and in incidental and informal learning in the workplace (Marsick and Watkins, 1990). For instructional application, a consistent body of theory about adult learning styles and how these can be effectively linked to educational enterprises can sharpen program planning and provide tools for authentic evaluation.

When we, as educators, come to fully understand the complexity of the unique internal processes that create adults' engagement in learning and affecting the ways each of them interacts with and shapes the learning environment itself, we can begin to move towards the sort of emancipatory learning endeavors called for by contemporary adult education theorists such as Collins (1991), Marsick (1991), Hart (1991), and Pierce (1991). Learning styles research has a necessary role to play in the growing body of thought addressing genuine empowerment of adult learners.

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